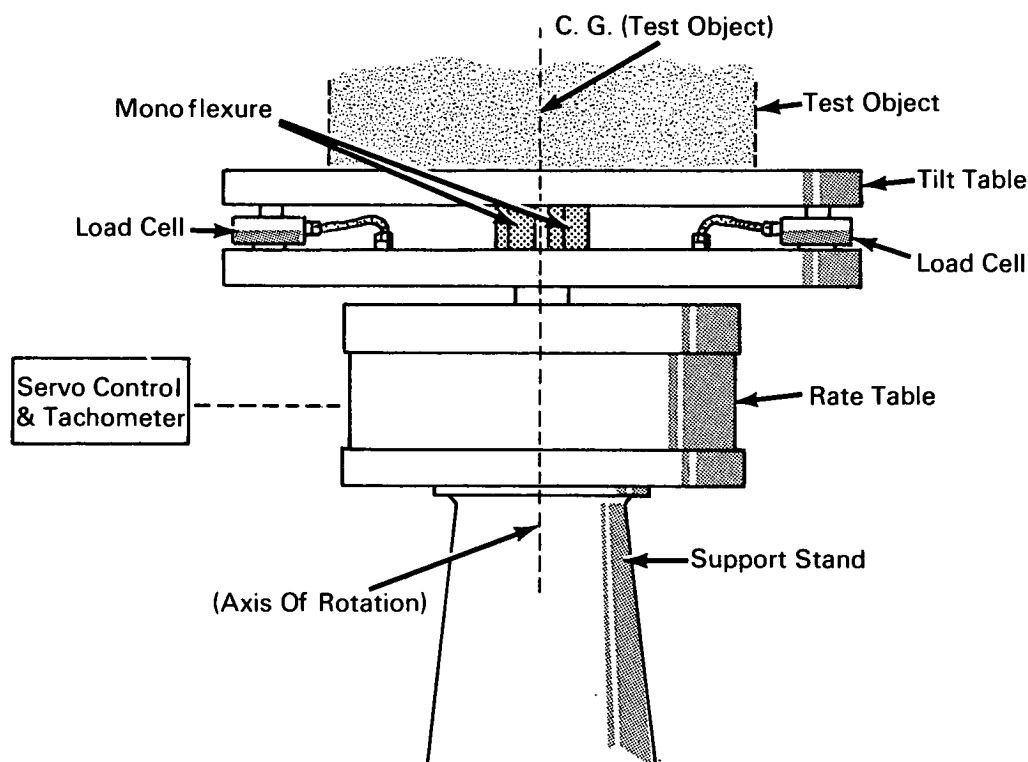


NASA TECH BRIEF



NASA Tech Briefs are issued to summarize specific innovations derived from the U.S. space program, to encourage their commercial application. Copies are available to the public at 15 cents each from the Clearinghouse for Federal Scientific and Technical Information, Springfield, Virginia 22151.

Automatic System Determines Moments of Inertia of Asymmetrical Objects



The problem:

To provide a means of rapidly and accurately determining moments and products of inertia of asymmetrical objects.

The solution:

A system combining a torsional pendulum arrangement and a precision rate table with simplified analog computers to determine the desired quantities directly, without the need for additional calculations.

How it's done:

The test object is placed upon the tilt table of the torsional pendulum and oscillations are induced in the system. A sensor detects each passing of the system through the center position and generates a pulse for each complete cycle of oscillation. These signals, after appropriate amplification and shaping, are used to trigger a bistable multivibrator, which in turn controls the timing of a reference voltage to an integrator circuit in an analog computer. The integrator output

(continued overleaf)

is a voltage proportional to the oscillation period of the pendulum, which is then used to compute the moment of inertia of the object.

For computation of the product of inertia, the object is rotated about its center of gravity on the precision rate table. The servo control and tachometer provide an electrical analog of the angular velocity, and load cells attached to the rate table give an electrical output corresponding to the unbalanced axial forces induced by the rotation. These signals are processed in the analog computer to yield the numerical value of the product of inertia.

Note:

Inquiries concerning this innovation may be directed to:

Technology Utilization Officer
Marshall Space Flight Center
Huntsville, Alabama 35812
Reference: B66-10636

Patent status:

No patent action is contemplated by NASA.

Source: Spaco, Inc.,
under contract to
Marshall Space Flight Center
(M-FS-1769)